How Does Our Immune System Protect Us?

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For this year's lecture series, I am trying a different format of transcript. Rather than a long form written document, which has been largely rendered obsolete by the ability to transcribe from the YouTube recording, this handout is a summary of the key topics in the lecture, together with some more extensive suggestions for extra reading. As ever, we would be delighted to hear your thoughts on this new approach!

Without thinking about it, we rely on our immune system every second of every day. Each breath we take is laden with live microbes just waiting to cause an infection. Without immunity, every scratch of a thorn has the potential to be life-threatening. And yet, happily, most of us will live long and healthy lives, despite this daily onslaught of pathogens, safely protected by the extraordinary machine that is the human immune system.

The complexity of the immune system is mind-blowing. Within your bloodstream, an estimated 10 billion white blood cells circulate – each of them poised to respond instantly to an infectious threat. Millions more immune cells are distributed within your organs, monitoring surrounding tissues for any sign of foreign invaders. At the first hint of trouble, they mobilise.

Phagocytic cells, like neutrophils and macrophages, rush to the source of the threat, guided by a 'scent trail' of microbial molecules that both help the white blood cells to home in on the pathogen and trigger them to raise the alarm more widely.

These cells, in turn, then release signaling molecules that trigger systemic changes in temperature, blood flow and cellular physiology, initiating the phenomenon that we know as inflammation. Finally, these early responders engage B- and T-cells of the adaptive immune system, triggering a highly coordinated precision attack on the invading pathogen and ensuring that the immune system retains a lasting memory of the threat, so as to respond more swiftly next time…

Key topic in the lecture	**Further reading**
A general overview of innate and adaptive immunity	BiteSized Immunology | British Society for Immunology An introduction to immunology and immunopathology | Allergy, Asthma & Clinical Immunology | Full Text
Innate immunity and inflammation	The conceptual foundations of innate immunity: Taking stock 30 years later: Immunity
Phagocytosis	Frontiers | Phagocytosis: Our Current Understanding of a Universal Biological Process
Antigen presentation	Antigen Processing and Presentation | British Society for Immunology Antigen presentation - Wikipedia
Allergy and anaphylaxis	Allergy | British Society for Immunology What is an Allergy? | Allergy UK | National Charity Adult anaphylaxis: A state-of-the-art review - European Journal of Internal Medicine

Diet and immunity	Diet and Immune Function Your diet can change your immune system — here's how Short-term dietary changes can result in mucosal and systemic immune depression | Nature Immunology